

REMARKS

Reconsideration of the application is respectfully requested in view of the following responsive remarks. For the Examiner's convenience and reference, Applicant's remarks are presented in the order in which the corresponding issues were raised in the Office Action.

In the Office Action of September 21, 2006 the following actions were taken:

(1) Claims 1-22 were rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Pat. No. 6,203,899 (hereinafter "Hirose") in view of U.S. Pat. No. 5,372,884 (hereinafter "Abe") and U.S. Pat. No. 3,007,878 (hereinafter "Alexander"), further in view of U.S. Pat. No. 5,965,252 (hereinafter "Santo").

It is respectfully submitted that the presently pending claims be allowed based on the remarks below.

Rejections Under 35 U.S.C. § 103

The Examiner has rejected claims 1-22 U.S.C. § 103(a) as being unpatentable over several references.

The issue under § 103 is whether the PTO has stated a case of *prima facie* obviousness. According to the MPEP § 2142, the Examiner has the burden and must establish a case of *prima facie* obviousness. It has been widely recognized that virtually every invention is a combination of elements and that most, if not all, of these will be found somewhere in an examination of the prior art. This reasoning lead the court, in *Connell v. Sears, Roebuck & Co.*, 220 U.S.P.Q. 193, 199 (Fed. Cir. 1983) to state:

"...it is common to find elements or features somewhere in the prior art. Moreover, most if not all elements perform their ordained and expected function. The test is whether the claimed invention as a whole, in light of all the teachings of the references in their entireties, would have been obvious to one of ordinary skill in the art at the time the invention was made."
(underlining added)

Emphasis on the independent claims is provided herein, as the Applicant asserts that these claims are all patentably distinct over the prior art. Specifically, the Examiner has rejected claims 1-22 as being obvious in view of Hirose, Abe, Alexander, and Santo. Thus, a brief discussion of these references is believed to be in order.

Hirose

Hirose discloses a printing medium containing a liquid-absorbent base material; an ink-receiving layer consisting of a pigment, a binder, and a cationic substance; and a surface layer consisting of cationic ultrafine particles. Hirose exemplifies the ultrafine particles as two distinct species: first, as “silica subjected to a surface treatment with a compound containing some of the cationic metal oxides or metal atoms as described above,” which were “magnesium, calcium, aluminum, zinc, chromium, iron, copper, tin, lead, and manganese,” and second, as “silica subjected to a surface treatment with an organic compound having both amino group or quaternary ammonium group thereof and functional group having reactivity to a silanol group on the surface of the silica.” See col. 4, lines 18-25. The Examiner also states that the cationized silica is formed either by treating it with a metal oxide or by treating it with organic compound having both an amino or quaternary ammonium group and a functional group. See February 6, 2006 Office Action, page 5, and September 21, 2006 Office Action, page 3.

Abe

Abe discloses an ink-jet recording sheet comprising a support and ink receiving layer wherein the ink receiving layer contains a cation-modified non-spherical colloidal silica. The silica is cation-modified by coating the silica with a hydrous metal oxide such as hydrous aluminum oxide, hydrous zirconium oxide, or hydrous tin oxide as carried out by the methods in Alexander. See col. 2, lines 48-58. The Examiner describes Abe in the same fashion. See February 6, 2006 Office Action, page 5, and September 21, 2006 Office Action, page 4.

Alexander

Alexander discloses the methods of making positively charged particles of dense silica by mixing them with a basic salt of a metal having a valence of 3 to 4, such as basic aluminum chloride. See col. 1, lines 11-16; col. 2, lines 21-26; col. 4, lines 9-11. The Examiner also states the Alexander teaches the “forming [of] a stable aquasol of positively charged coated silica particles.” See February 6, 2006 Office Action page 5, last paragraph, and September 21, 2006 Office Action, page 4.

Santo

Santo discloses a printing medium comprising a substrate and an ink receiving layer. The ink receiving layer comprises an alumina hydrate surface-treated with a coupling agent. See Abstract. The coupling agent is preferably a silane coupling agent. See col. 7, lines 22-24. The Examiner also states that Santo teaches “an alumina hydrate surface-treated in an aqueous dispersion with a silane coupling agent” See February 6, 2006 Office Action, page 7, and September 21, 2006 Office Action, page 4.

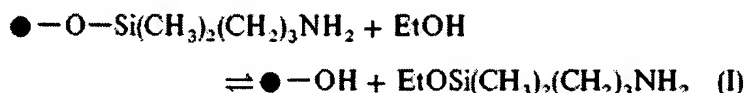
Claims 1-22

The Examiner has rejected claims 1-22 using a combination of the aforementioned references; Hirose, Abe, Alexander, and Santos. Each method claim proscribes a method that contains at least 3 distinct steps. First, the silica is dispersed in water. Second, the silica’s negative charge is reversed by a surface-activating agent forming a surface-activated silica. Third, the surface-activated silica is then reacted further with an organosilane reagent to form a reagent-modified and surface-activated silica. Dependent claims 2-4 vary the order of the first two steps of the method but the reagent-modifying step is always performed such that the organosilane reagent is attached to the surface-activated silica, which requires that the surface-activated silica exist before or as the organosilane reagent is attached.

The Examiner has combined Hirose with Abe and Alexander to provide the surface-activated silica required by the present invention. However, the Examiner also noted that such a combination “fail[s] to teach that (i) colloidal silica particles are treated first with alumina or alumina hydrate so that a negative charge on its surface changes to a positive charge forming cationized silica then the cationized silica having on its surface alumina or alumina hydrate is contacted with the organosilane reagent to form organosilane modified cationized silica.” See Office Action page 3. In order to cure the deficiency, the Examiner then combines Hirose, Abe, and Alexander with Santo, which teaches an alumina hydrate surface treated with a silane coupling agent. However, the Applicant maintains that this combination of references is improper and does not teach the method claimed by the present invention.

None of the references cited by the Examiner teach the multiple steps of cationizing the surface of the silica and modifying the cationized silica with an organosilane reagent. To reiterate, the present pending claim set requires (1) silica particles in an aqueous dispersion, (2) reversing the surface charge from negative to positive using a surface activating agent,

and (3) contacting the surface activated silica particles with organosilane reagents to form the reagent-modified, surface-activated silica particulates. All four references cited by the Examiner teach modification of particles in one manner or another. Additionally, all four references do not teach reagent modifying a surface treated particle. Specifically, Hirose teaches surface activation by two different methods. However, Hirose does not teach cationizing the silica and then reagent modifying the modified silica. Similarly, Abe/Alexander teaches surface activation of silica using basic aluminum chloride. However, Abe/Alexander does not teach cationizing the silica and then reagent modifying the silica. To attempt to remove this deficiency, the Examiner uses Santos. There, the Examiner alleges that “[o]ne of ordinary skill in the art would have *motivation and reasonable expectation of* success to have treated a coated silica in Hirose et al in view of Abe et al and Alexander et al with an organosilane reagent . . . since the coated silica in Hirose et al in view of Abe et al [] and Alexander et al has the same alumina hydrate surface as in Santo et al. . . .” See Office Action page 8. However, this is incorrect for two reasons. First, Hirose in view of Abe/Alexander would not have the same surface as Santos. Second, in view of the teachings of Hirose, Abe/Alexander, and Santos, the state of the art does not teach such a combination. To be clear, Hirose teaches the same chemistry as Santos; the only difference being one is a silica particle and the other is an alumina particle. The actual surface chemistry is well known and consists of the oxygen on the surface of the particle bonding to the silicon atom as the ethoxy group leaves as represented in the following reaction scheme (I):



Where \bullet represents the silica

The fact that both Santos and Hirose disclose surface activating their particles with γ -aminopropyltriethoxysilane only serves to prove that these references do not teach the claimed invention. At best, Hirose in view of Abe/Alexander would be a partially covered silica particle surface-activated by basic aluminum chloride in an aqueous environment while the surface of Santos would teach a similarly modified alumina particle. These surfaces are not the same. To be absolutely clear, the only difference in the chemistry of Hirose and Santos is that Hirose starts with a silica particle and Santos starts with an alumina particle. The critical question is whether the combination teaches the multi-step synthesis as presently claimed. The Applicant wishes to reiterate that none of the cited references teach the present

process. All of the references are directed towards surface modification by traditional methods. Even if such a combination were proper, the present invention contains an element not found in any of the references or combination of references, which is modifying a pre-modified silica particle.

The Examiner has combined three silica references with an alumina reference. Hirose, Abe, and Alexander are silica references, each referring to silica particles and specifically teaching silica surface activation, as opposed to Santos, which refers to alumina particles (not coatings) and teaches alumina particle surface activation. The combination of Hirose, Abe, and/or Alexander with Santos would lead to a co-dispersion of silica and alumina particles that are separately modified. As the present invention requires silica surface activation, followed by reagent modification, such a combination is improper, and further, does not arrive at all the claimed limitations.

As previously argued in the past office action response, Santos teaches a surface-activated alumina hydrate. To be clear, alumina hydrate is not the aluminum chloride hydrate as found in the Applicant's disclosure. Alumina and aluminum are distinct in this context; the first referring to a particle and the later referring to an individual atom which is part of a chemical molecule. Specifically, in Santos, alumina is a particle having "pore properties" "within a range of from 0.1 to 1.0 ml/g" and a "specific surface area" "of from 40 to 500 m²/g." See col. 4, lines 15, 19-21, 25-26. The surface of the alumina can be modified to have Al-O, Al-OH, or Al-H as well as an Al-silane coupling agent. See col. 3, lines 60-65; col. 4, lines 39-43. Therefore, the alumina activated surface of Santos and the silica activated surface of Hirose, Abe, and Alexander are similar in at least one way, in that they both include particles that have chemicals attached thereto. The aluminum chloride hydrate of the present invention is more of a chemical coating, whereas the alumina hydrate of Santos is a particle. Thus, the Applicant contends that the combination of these references is improper and would have no likelihood of success at achieving the present invention. As Santos teaches a surface-treated alumina particle and Hirose, Abe, and Alexander teach surface-activated silica particles, the combination of these references would provide a mixture of silica and alumina particles. There is no teaching that the combination of these particles would react to form the reagent-modified and surface-activated silica of the present invention. In other words, an alumina particle cannot be substituted for an activation chemical, as an alumina particle would not "activate" a silica particle. Furthermore, the Applicant contends that an attempt to combine single reaction steps from different reaction

schemes with different reaction materials is highly problematic, likely to fail, and therefore, would have to be based on impermissible hindsight.

Therefore, the Applicant submits that the pending claim set is novel and respectfully requests that the Examiner withdraw the rejection.

CONCLUSION

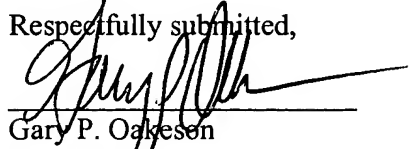
Because the combination of references does not teach the method of the present invention, the Applicant respectfully asserts the Examiner has not satisfied the requirement for establishing a case of *prima facie* obviousness. Therefore, the pending claim set is believed to be allowable. Reconsideration is respectfully requested.

In view of the foregoing, Applicants submit that claims 1-22 present allowable subject matter and allowance is respectfully requested. If any impediment to the allowance of these claims remains after consideration of the above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone W. Bradley Haymond (Registration No. 35,186) at (541) 715-0159 so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 08-2025.

Dated this 21st day of December, 2006.

Respectfully submitted,



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